

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended): A high strength steel sheet excellent in formability, resistant to delayed fracture and compatible with chemical converted conversion coating treatment~~[,]~~ and hot-dip galvanizing, ~~and resistant to delayed fracture,~~ characterized in that: said steel sheet consisting essentially of, in mass,

0.03 to 0.20% C,

0.107 to 0.3% Si,

1.0 to 3.1% Mn,

0.001 to 0.06% P,

0.001 to 0.01% S,

0.0005 to 0.01% N,

0.2 to 1.2% Al,

and not more than 0.5% Mo,

with the balance consisting of Fe and unavoidable impurities; the amounts of Si and Al in mass % and the target strength (TS) of said steel sheet satisfy the following expression (1); and the metallographic structure of said steel sheet contains ferrite and martensite without containing retained austenite and has a tensile strength of 980 MPa or more and a value of TS x E1 of 16,000 or more;

$$(0.0012 \times [\text{target strength TS}] - 0.29 - [\text{Si}]) / 2.45 < \text{Al} < 1.5 - 3 \times [\text{Si}] \dots (1)$$

where, [target strength TS] is the designed strength of said steel sheet in terms of MPa and [Si] is the amount of Si in terms of mass %.

2 (currently amended): A high strength steel sheet excellent in formability, ~~chemical converted treatment and hot-dip galvanizing according to claim 1, characterized by~~

further consisting essentially of at least one of, in mass, 0.01 to 0.1% V, 0.01 to 0.1% Ti, and 0.005 to 0.05% Nb.

3 (currently amended): A high strength steel sheet excellent in formability, ~~chemical converted treatment and hot-dip galvanizing~~ according to claim 1 or 2, characterized by: further consisting essentially of 0.0005 to 0.002 mass % B; and satisfying the following expression (2),

$$500 \times [B] + [Mn] + 0.2[Al] < 2.9 \dots (2)$$

where, [B] is the amount of B, [Mn] that of Mn, and [Al] that of Al, each in terms of mass %.

4 (currently amended): A high strength steel sheet excellent in formability, ~~chemical converted treatment and hot-dip galvanizing~~ according to claim 1 or 2, characterized by further consisting essentially of, in mass, one or both of 0.0005 to 0.005% Ca and 0.0005 to 0.005% REM.

Claim 5: (canceled).

6 (currently amended): A high strength steel sheet excellent in formability, ~~chemical converted treatment and hot-dip galvanizing~~ according to claim 1 or 2, characterized in that wherein said steel sheet is a hot-rolled steel sheet or a cold-rolled steel sheet.

7 (currently amended): A high strength steel sheet excellent in formability, ~~chemical converted treatment and hot-dip galvanizing~~ according to claim 1 or 2, characterized in that wherein hot-dip galvanizing treatment is applied to said steel sheet.

8 (withdrawn – presently amended): A method for producing a high strength steel sheet excellent in formability, ~~chemical converted treatment and hot-dip galvanizing~~ according to claim 1, characterized in that wherein said steel sheet is produced through the processes of: hot rolling at a finishing temperature of the Ar₃ transformation temperature or higher; coiling at 400°C to 550°C; successively applying ordinary pickling; thereafter primary cold rolling at a reduction ratio of 30 to 70%; then recrystallization annealing in a continuous annealing process; and successively skin-pass rolling.

9 (withdrawn – presently amended): A method for producing a high strength steel sheet excellent in formability, chemical converted treatment and hot dip galvanizing according to claim 8, characterized in that wherein, in said annealing process, said steel sheet is: heated to a temperature in the range from the Ac_1 transformation temperature to the Ac_3 transformation temperature + 100°C; retained for 30 sec. to 30 min.; and thereafter cooled to a temperature range of 600°C or lower at a cooling rate of not less than X °C/sec., X satisfying the following expression (3), $X \geq (Ac_3 - 500)/10^a$... (3)

$$a = 0.6[C] + 1.4[Mn] + 3.7[Mo] - 0.87,$$

where, X is a cooling rate in terms of °C/sec., Ac_3 is expressed in terms of °C, [C] is the amount of C, [Mn] that of Mn, and [Mo] that of Mo, each in terms of mass %.

10 (currently amended): A high strength steel sheet excellent in formability, chemical converted treatment and hot dip galvanizing according to claim 3, characterized by further consisting essentially of, in mass, one or both of 0.0005 to 0.005% Ca and 0.0005 to 0.005% REM.

11 (currently amended): A high strength steel sheet excellent in formability, chemical converted treatment and hot dip galvanizing according to claim 3, characterized in that wherein said steel sheet is a hot-rolled steel sheet or a cold-rolled steel sheet.

12 (currently amended): A high strength steel sheet excellent in formability, chemical converted treatment and hot dip galvanizing according to claim 4, characterized in that wherein said steel sheet is a hot-rolled steel sheet or a cold-rolled steel sheet.

13 (currently amended): A high strength steel sheet excellent in formability, chemical converted treatment and hot dip galvanizing according to claim 3, characterized in that wherein hot-dip galvanizing treatment is applied to said steel sheet.

14 (currently amended): A high strength steel sheet excellent in formability, chemical converted treatment and hot dip galvanizing according to claim 4, characterized in that wherein hot-dip galvanizing treatment is applied to said steel sheet.

15 (currently amended): A high strength steel sheet ~~excellent in formability, chemical converted treatment and hot-dip galvanizing~~ according to claim 6, characterized in that wherein hot-dip galvanizing treatment is applied to said steel sheet.

16 (new): A high strength steel sheet according to claim 1, wherein the steel sheet contains Mn in an amount from 2.02% to 3.1%.

17 (new): A high strength steel sheet according to claim 1, wherein the steel sheet does not contain any one of Nb, V, B and Ti.

18 (new): A high strength steel sheet excellent in formability, resistant to delayed fracture and compatible with chemical conversion coating treatment and hot-dip galvanizing, said steel sheet consisting of, in mass,

0.03 to 0.20% C,
0.107 to 0.3% Si,
1.0 to 3.1% Mn,
0.001 to 0.06% P,
0.001 to 0.01% S,
0.0005 to 0.01% N,
0.2 to 1.2% Al,
and not more than 0.5% Mo,
at least one of 0.01 to 0.1% Ti, 0.005 to 0.05 Nb, and 0.01 to 0.1% V;

with the balance consisting of Fe and unavoidable impurities; the amounts of Si and Al in mass % and the target strength (TS) of said steel sheet satisfy the following expression (1); and the metallographic structure of said steel sheet contains ferrite and martensite without containing retained austenite and has a tensile strength of 980 MPa or more and a value of TS x E1 of 16,000 or more;

$$(0.0012 \times [\text{target strength TS}] - 0.29 - [\text{Si}]) / 2.45 < \text{Al} < 1.5 - 3 \times [\text{Si}] \dots (1)$$

where, [target strength TS] is the designed strength of said steel sheet in terms of MPa and [Si] is the amount of Si in terms of mass %.